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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,898	02/20/2004	Srinivas Bollapragada	52493.000362	4222

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HUNTON & WILLIAMS LLP  
INTELLECTUAL PROPERTY DEPARTMENT  
1900 K STREET, N.W.  
SUITE 1200  
WASHINGTON, DC 20006-1109

EXAMINER
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WONG, ERIC TAK WAI

ART UNIT	PAPER NUMBER
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4172

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/781,898	<b>Applicant(s)</b> BOLLAPRAGADA ET AL.	
	<b>Examiner</b> Eric T. Wong	<b>Art Unit</b> 4172	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/22/2004</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-21 are pending. The following is a non-final first Office action on the merits of claims 1-21.

#### ***Claim Objections***

2. Claims 1, 3, 4, 14, 17, 18, and 21 objected to because of the use of the term "the space". There is no antecedent basis for this term. It is apparent that applicant is referring to a space that includes all possible solutions defined by the competing objectives and plurality of constraints.

#### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1, 10, 13, 17, 20, and 21 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "substantially" is a relative term which renders the claims indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

#### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claim 1-13 and 16-21 rejected under 35 U.S.C. 102(e) as being anticipated by Chakraborty et al. (US Patent Application Pub. No. US 2004/0186804 A1).

7. The applied reference has a common inventor with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

**Regarding claim 1:**

Chakraborty et al. discloses a method for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the method comprising:

- generating an initial population of solutions of portfolio allocations, the generating the initial population of solutions of portfolio allocations including systematically generating the initial population of solutions to substantially cover the space defined by the competing objectives and the plurality of constraints, (see [0163]); and

- generating an efficient frontier in the space based on the initial population, the efficient frontier for use in investment decisioning, (see Figure 8 and [0026]).

**Regarding claim 2:**

Chakraborty et al. discloses wherein the generating the initial population of solutions uses a combination of linear programming and sequential linear programming algorithms, (see [0031]).

**Regarding claim 3:**

Chakraborty et al. discloses wherein the competing objectives include risk and return and the space is a risk/return objectives space, (see [0031]).

**Regarding claim 4:**

Chakraborty et al. discloses wherein the space is defined by greater than three dimensions, (see [0090]).

**Regarding claim 5:**

Chakraborty et al. discloses wherein the initial population of solutions includes multiple initial feasible points, (see [0163]).

**Regarding claim 6:**

Chakraborty et al. discloses wherein the multiple initial feasible points are generated by solving linear programs, (see [0160]).

**Regarding claim 7:**

Chakraborty et al. discloses wherein the linear programs utilize randomized parameters, (see [0162]).

**Regarding claim 8:**

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Chakraborty et al. discloses wherein the generating the initial population of solutions of portfolio allocations includes generating portfolios with different combinations of risk and returns values, (see [0163]).

**Regarding claim 9:**

Chakraborty et al. discloses wherein the generating portfolios with different combinations of risk and returns values are performed by adding additional risk and return constraints to a linear program corresponding to the risk and return objectives, (see [0165]).

**Regarding claim 10:**

Chakraborty et al. discloses wherein portfolios with substantially all feasible combinations of risk and return values are generated by modifying parameters of the added risk and return constraints, (see [0090] and [0163]).

**Regarding claim 11:**

Chakraborty et al. discloses wherein the generating the initial population of solutions of portfolio allocations includes generating portfolios with different combinations of competing values, (see [0163]).

**Regarding claim 12:**

Chakraborty et al. discloses wherein the generating portfolios with different combinations of competing values are performed by adding additional competing value constraints to a linear program corresponding to the objectives of the competing values, (see [0163]).

**Regarding claim 13:**

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Chakraborty et al. discloses wherein portfolios with substantially all feasible combinations of the competing values are generated by modifying parameters of the added competing value constraints, (see [0090] and [0163]).

**Regarding claim 16:**

Chakraborty et al. discloses wherein nonlinear risk and return constraints are approximated with linear constraints generated by a sequential linear programming, (see [0159]).

**Regarding claim 17:**

A system for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the system comprising:

a population generation portion that generates an initial population of solutions of portfolio allocations, the population generation portion systematically generating the initial population of solutions to substantially cover the space defined by the competing objectives, (see [0163]), the population generation portion including:

- a range value generation portion for varying values of the competing objectives over a range of each competing objective, (see [0163]);
- a linear program portion, the linear program portion:
  - solving a linear program, for each of the linear constraints, multiple times by setting a weight vector equal to one of the linear constraints, (see [0078]); and

- solving the linear program multiple times by setting the weight vector equal to a randomly generated vector, (see [0090]); and
- wherein the range value generation portion and the linear program portion iteratively perform their respective operations until the range of possible values for each competing objective is substantially covered so that an efficient frontier is generated, the efficient frontier being used in investment decisioning, (see [0031] and [0090]).

**Regarding claim 18:**

Chakraborty et al. discloses wherein the competing objectives include risk and return and the space is a risk/return objectives space, (see [0031]).

**Regarding claim 19:**

Chakraborty et al. discloses wherein the generating the initial population of solutions of portfolio allocations includes generating portfolios with different combinations of competing objectives, (see [0163]).

**Regarding claim 20:**

The claim is drawn to a computer-readable medium with the same limitations as the system of claim 17 and is therefore similarly rejected.

**Regarding claim 21:**

A method for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the method comprising:



- generating an initial population of solutions of portfolio allocations, the generating the initial population of solutions of portfolio allocations including systematically generating the initial population of solutions to substantially cover the space defined by the competing objectives and the plurality of constraints, (see [0163]); and
- generating an efficient frontier in the space based on the initial population, the efficient frontier for use in investment decisioning, (see Figure 8 and [0026]);
- wherein the competing objectives include risk and return and the space is a risk/return objectives space, (see [0031]);
- wherein the generating the initial population of solutions of portfolio allocations includes generating portfolios with different combinations of risk and returns values, (see [0163]);
- wherein the generating portfolios with different combinations of risk and returns values are performed by adding additional risk and return constraints to a linear program corresponding to the risk and return objectives, (see [0163]); and

wherein portfolios with substantially all feasible combinations of risk and return values are generated by modifying parameters of the added risk and return constraints, (see [0090] and [0163]).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Chakraborty et al. in view of Zosin et al. (US Patent Application Pub. No. US 2004/0181479 A1).

**Regarding claim 14:**

Zosin et al., not Chakraborty et al., teaches:

- performing a first multi-objective process, based on the initial population and the competing objectives, to generate a first interim efficient frontier, (see [0057]);
- performing a second multi-objective process, based on the initial population and the competing objectives, to generate a second interim efficient frontier, (see [0057]); and
- fusing the first interim efficient frontier with the second interim efficient frontier to create an augmented efficient frontier, (see [0057]).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Chakraborty et al. with Zosin et al. One would have been motivated to make such modification in order to accommodate for alternative inputs.

10. Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Chakraborty et al. in view of Zosin et al, further in view of Iyer's paper entitled "A Family of Dominance Filters for Multiple Criteria Decision Making: Choosing the Right Filter for a Decision Situation".

**Regarding claim 15:**

Iyer, not Chakraborty et al. or Zosin et al., teaches wherein a dominance filter process is applied on the augmented efficient frontier to create a global efficient frontier, (see abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of claim 14 above with Iyer. One would have been motivated to make such modification because dominance filters allow for a selection of good alternatives from a set of alternatives.

***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric T. Wong whose telephone number is (571) 270-3405. The examiner can normally be reached on Monday-Friday 7:30AM-5:00PM, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dixon can be reached on (571) 272-6803. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Naeem Haq/  
Primary Examiner, Art Unit 4172

Eric T. Wong  
Examiner  
Art Unit 4172

Nov 07